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ACADEMIC DEGREES AND EDUCATION

1979	Bachelor's degree in applied mathematics, M. V. Lomonosov Moscow State University, diploma *cum laude*
1982	PhD in Physical and Mathematical Sciences, Optimal Control Theory, M. V. Lomonosov Moscow State University
1992	Doctor of Physical and Mathematical Sciences, Optimal Control Theory, M. V. Lomonosov Moscow State University

Doctoral Dissertation: Regularity of Extremal Controls in Optimal Control Problems

ACADEMIC POSITIONS AND RESEARCH

1997 – present	Geological Scientist, Earth Science Division, Lawrence Berkeley National Laboratory, University of California, Berkeley (present position)
2007	Visiting Scholar at the International Research Institute Stavanger, Norway
1997	Visiting Scholar at the Department of Materials Science and Mineral Engineering, University of California, Berkeley
1996 – 1997	Modeling and parameter identification for flow in porous media, Research Fellow of the National Academy of Sciences/National Research Council Radioactive Waste Management Program attached to the University of California and Fogwell Consultants
1990 – 1996	Associate professor (dozent) at the Department of Computational Mathematics and Cybernetics, M. V. Lomonosov Moscow State University, Moscow, Russia
1994 – 1995	Lise Meitner Fellow, Karl-Franzens Universität Graz, Austria
1982 – 1990	Assistant professor at the Department of Computational Mathematics and Cybernetics, M.V.Lomonosov Moscow State University, Moscow, Russia
1993 – 1996	Theoretical studies in Hamilton-Jacobi equations, Principal Investigator, M. V. Lomonosov Moscow State University, Moscow, Russia
1992 – 1994	Application of differential games methods in modeling of aircraft landing, Leading Investigator, M. V. Lomonosov Moscow State University, Moscow, Russia
1988	Visiting Scholar, International Institute for Applied System Analysis, (IIASA), Laxenburg, Austria
1978 – 1996	Researcher, project leader: Modeling and optimization of technological processes in microelectronics, M. V. Lomonosov Moscow State University, Moscow, Russia

HONORS

2006	US EPA Region 9 award "For Exceptional Contribution. Underground

	Injection Control Class V Experimental Permit Biosolids Slurry Fracture Injection City of Los Angeles Project"
2005	Editors' Citation for Excellence in Refereeing for Water Resources Research
1994 – 1996	Fellowship for advanced scientists, Russian Academy of Sciences
1994 – 1995	Lise Meitner Fellowship, Karl-Franzens Universität, Graz, Austria
1992	Deutscher Akademischer Austauschdienst (DAAD) Scholarship, Department of Applied Mathematics, Institute for Mathematics, University of Bayreuth, Germany
1987	USSR Department of Education Prize for Developing New Technologies

REVIEWER

SIAM Journal on Control and Optimization
Zentralblatt für Mathematik
Aequationes Mathematicae
Transport in Porous Media
Geophysics
Society of Petroleum Engineers Journal
Water Resources Research Journal
Advances in Water Resources
Journal of Porous Media
Acta Geotechnica
Soil Science Society of America Journal
Machine Vision and Applications Journal
International Journal for Numerical and Analytical Methods in Geomechanics
Theoretical and Computational Fluid Dynamics
U. S. National Science Foundation
Israel Science Foundation
U.S. DOE The Office of Basic Energy Sciences
U.S. E.P.A. Technical Advisory Committee

U. S. PATENT

2007	7,248,969 "Waterflood Control System for Maximizing Total Oil Recovery"

GENERAL RESEARCH INTEREST

Mathematical models in earth sciences:
Mathematical model and small-parameter asymptotic study of frequency-dependent reflection of seismic signal from a fluid-saturated formation
Mathematical model of non-equilibrium multiphase flow in porous media
Pore-scale fluid flow modeling
Mathematical model of coupled fluid flow and damage propagation in natural rocks
Transport in lower turbulent atmospheric boundary layer: concentration profile scaling
Automatic field-scale waterflood surveillance and control: mathematical modeling and software implementation

Optimal control theory and optimization:
Inverse problems and parameter identification
Generalized solutions to nonlinear partial differential equations
Non-smooth and set-valued analysis methods

JOURNAL PUBLICATIONS

1. Silin, D., and Goloshubin, G. An asymptotic model of seismic reflection from a permeable layer. *Transport in Porous Media*, 2010 In press

2. Holtzman, R., Silin, D. B., and Patzek T. W. Frictional granular mechanics: A variational approach. International Journal for Numerical Methods in Engineering, 2010, **81** Issue 10, Pages 1259 - 1280

3. Silin, D., and Virnovsky, G. A Variational Model of Disjoining Pressure: Liquid Film on a Nonplanar Surface. *Transport in Porous Media*, In press, available on line

4. Schwartz, K., Patzek T. W. and Silin, D. Dispersion by wind of CO_2 leaking from underground storage. *International Journal of Greenhouse Gas Control*. 2009, **3**, Issue 4, July 2009, p. 422-430.

5. Frette O. I., Virnovsky, G., and Silin, D. Estimation of the curvature of an interface from a digital 2D image. *Computational Materials Science* **44**, Issue 3, January 2009, 867-875

6. Holtzman, R., Silin, D. B., and Patzek T.W. Mechanical properties of granular materials: a variational approach to grain-scale simulations. *International Journal for Numerical and Analytical Methods in Geomechanics*, 2009 **33**, 391-404

7. Silin, D., and T.W. Patzek, and S. M. Benson. A one-dimensional model of vertical gas plume migration through a heterogeneous porous medium. *International Journal on Greenhouse Gas Control*, 2009, **3,** 300-310.

8. Silin, D., T.W. Patzek, and S. M. Benson. A Model of Buoyancy-Driven Two-Phase Countercurrent Fluid Flow. *Transport in Porous Media*, 2009, February, **76**, No. 3, p. 449-469.

9. Wessling, S., R. Junker, J. Rutqvist, D. Silin, H. Sulzbacher, T. Tischner, and C.-F. Tsang. Pressure Analysis of Hydromechanical Effects in a Stimulated Tight Sedimentary Geothermal Reservoir. *Geothermics,* 2009, **38**, 211-226

10. Goloshubin, G., Silin, D., Vingalov, V., Takkand, G., and Latifullin, M. Reservoir permeability from seismic attribute analysis. *The Leading Edge*, 2008, March, 376-381

11. Tomutsa, L., Silin, D., and Radmilovic, V. Nanometer-Scale Imaging and Pore-Scale Fluid Flow Modeling in Chalk, SPE Reservoir Evaluation and Engineering Journal, 2007, June, v. **10**, 3, p. 285-293

12. Silin, D. B., and Patzek, T. W. Pore space morphology analysis using maximal inscribed spheres. Physica A, 371:336–360, 2006.

13. Goloshubin, G., Korneev, V. Silin, D., and Vingalov, V. Reservoir imaging using low frequencies of seismic reflections. *The Leading Edge*, 2006, May, 527-531

14. Silin, D. B., Korneev, V. M., Goloshubin, V. M., and Patzek, T. W. Low-frequency asymptotic analysis of seismic reflection from a fluid-saturated medium. *Transport in Porous Media*, 2006, **62**: p. 283–305.

15. Silin, D., C.-F. Tsang, and G. Harlan. Replacing Annual Shut-In Well Tests by Analysis Of Regular Injection Data: Field-Case Feasibility Study. Chapter 11 in Dev in Water Science, **52**. Chin-Fu Tsang John A. Apps, Editors Elsevier, 2005 pp. 139-149

16. Silin, D.B. Jin, G., and Patzek, T.W. Robust determination of the pore-space morphology in sedimentary rocks. *Journal of Petroleum Technology*. 2004, **56**(5): p. 69-70

17. Silin, D. and Patzek, T. On Barenblatt's model of spontaneous countercurrent imbibition. *Transport in Porous Media*. 2004, **54**(3) p. 297-322, Mar.

18. Korneev V. A., Goloshubin G. M., Daley T. M., and Silin D. B. Seismic low-frequency effects in monitoring fluid-saturated reservoirs. *Geophysics*. **69**(2):522-532, 2004 Mar-Apr.

19. Barenblatt, G. I., Patzek, T. W., and Silin D. B. The mathematical model of non-equilibrium effects in water-oil displacement. *SPE Journal*, 2003, p. 409-416 Dec.

20. Silin, D. B., and Tsang, C.-F. A well-test analysis method accounting for pre-test operations. *SPE Journal.* 2003 **8**(1), p. 22-31, Mar

21. Patzek, T. W., Silin, D. B., Benson, S. M., and Barenblatt, G. I. On vertical diffusion of gases in a horizontal reservoir. *Transport in Porous Media*, 2003 **51**, p 141-156.

22. Silin, D. B., and Tsang, C.-F. Estimation of formation hydraulic properties accounting for pre-test injection or production operations. *Journal of Hydrology*, 2002, **265**, p. 1-14

23. Silin, D. B., and Patzek, T. W. Control model of water injection into a layered formation. 2001 *SPE Journal*. **6**(3), p. 253-261, Sep.

24. Patzek, T. W., and Silin, D. B. Shape Factor and Hydraulic Conductance in Noncircular Capillaries: I. One-Phase Creeping Flow. *Journal of Colloid and Interface Science*, 2001, **236**, No. 2, 295-304.

25. Patzek, T. W. and Silin, D. B. Control of Fluid Injection into a Low-Permeability Rock - 1. Hydrofracture Growth. *Transport in Porous Media*, 2001, 43, No. 3, 537-555

26. Silin, D. B. and Patzek, T. W. Water Injection into a Low-Permeability Rock - 2. Control Model. *Transport in Porous Media*, 2001, **43**, No. 3, p. 557-580

27. Silin, D. B. and Patzek, T. W. Support-Operators Method in the Identification of Permeability Tensor Orientation *SPE Journal,* 2001, Dec. p. 385-398

28. Silin, D. B. Viscosity Solutions via Unbounded Set-Valued Integration. *Nonlinear Analysis. Theory, methods and applications*, 1998, **31**, p. 55-90

29. Silin, D. B. Generalizing Hopf and Lax-Oleînik formulae via conjugate integral. *Monatshefte für Mathematik*, 1997, **124**, p. 343-364

30. Orlova, G. B., and Silin, D. B. Approximate Calculation of the Convex Hull of a positively Homogeneous Function. *Moscow University Computational Mathematics and Cybernetics*, 1997, No. 2, p. 44-49.

31. Silin, D. B. On Set-Valued Differentiation and Integration. *Set-Valued Analysis*, **5**, 1997, p. 107-146.

32. Silin, D. B. Conjugate Integral and viscosity solutions to Hamilton-Jacobi Equations. *Differential Equations,* 1996, **32**, No 8, p. 1145.

33. Lempio, F., and Silin, D. B. On differential inclusions with strengthened one-sided Lipschitz right hand sides*. Differential Equations*, 1996, **32**, p. 1485-1491

34. Grigorenko, N. L., Kiselev, Yu. N., Lagunova, N. V., Silin, D. B., and Trin'ko, N. G. Solution Methods for Differential Games. *Computational and Mathematical Modeling*, 1996, 7, No 1, p. 101-116

35. Silin, D. B. Set-Valued Differentiation and Integration via Quasi-Affine Mappings. *Russian Math. Doklady*, 1995, **340**, No. 2.

36. Silin, D. B. Set-Valued Integration and Viscosity Solutions to the Hamilton-Jacobi Equation. *Differential Equations*, 1995, **31**, No.1, p. 116-123

37. Nikolskii, M. S., and Silin, D.B. On the Best Approximation of a Convex Compact Set by Elements of an Addial. *Proceedings of Steklov Institute of Mathematics*, 1995, **211**, p. 338-354.

38. Silin, D. B. and Trinko, N. G. A modification of Graham's algorithm for the convexification of a positive-homogeneous function. *Computational Mathematics and Mathematical Physics*, 1994, **34**, N 4, 545 - 548.

39. Silin, D. B. On the generalized alternated integral approximation. *Moscow University Computational Mathematics and Cybernetics*, 1994, N 1.

40. Silin, D. B. On Discontinuous Strategies in Optimal control Problems. *Journal of Mathematical Systems, Estimation and Control*, 1994, **4**, N 2, p, 205--217.

41. Arutyunov, A. V., Zerkalov, L. G., and Silin, D. B. Maximum Principle and Second Order Necessary Conditions in Minimax Optimal Control Problems. *The Journal of Optimization Theory and Applications*, 1992, **75**, N 3, p, 521 - 533.

42. Silin, D. B. On Typical Properties of Time-Optimal Controls in Linear Problems. *Mathematical Notes*, 1991, **42**, N 2, p. 189-193.

43. Silin, D. B. Some Properties of Upper Semicontinuous Set-Valued Mappings. *Proceedings of Steklov Institute of Mathematics,* 1990, **185**, 249--262.

44. Arutyunov, A. V., Zerkalov, L. G., and Silin, D. B. Necessary Conditions of the First and Second Order for a Minimax Optimal Control Problem. *Moscow University Computational Mathematics and Cybernetics,* 1990, p.56-61.

45. Silin, D. B. On Upper Semicontinuous Multivalued Mappings. *Soviet Math. Doklady*, 1987, **35**, N 3, 587--590.

46. Silin, D. B. Time-Optimal Linear Problems with Controls Discontinuous on a Set of Positive Measure. *Math. USSR Sbornik*, 1987, **57**, N 1, p.277-291.

47. Silin, D. B. Riemann Integrability of an Optimal Control in Time-Optimal Linear Problems. *Mathematics of the USSR Izvestia*, 1985, **25**, N 1, p. 183-192.

48. Silin, D. B. Discontinuous optimal controls in linear problems. *Soviet Math. Doklady.* 1985, **32**, N 2, p. 106-108.

49. Silin, D. B. Subdifferentials of Convex Functions and Integrals of Multiple-Valued Mappings. *Moscow University Computational Mathematics and Cybernetics*, 1984, N 1, p.71-76.

50. Silin, D. B. Finite-Response Controlled Systems. *Moscow University Computational Mathematics and Cybernetics*, 1982, N 3, p. 54-60.
51. Silin, D.B. The Total Variation of Optimal Control in Linear Systems. *Mathematical Notes*, 1982, **31**, N 5-6, p. 385-390.
52. Silin, D. B. On the Variation and Riemann integrability of an optimal control in Linear Systems. *Soviet Math. Doklady*, 1981, **23**, N 2, p. 309-311.
53. Varga, Z., and Silin, D. B. Pareto Optimality in Vector Spaces. *Moscow University Computational Mathematics and Cybernetics,* 1981, N 4, p. 34-38.
54. Denisov, D. V., Potapov, M. M., Proshkin, V. A., Serov, V. S., and Silin, D. B. Entry Tests to the Moscow State University. *Mathematics in School*, 1991, N1, p. 35-44, in Russian
55. Lomov, I. S., Proshkin, V. A., Sokolikhin, A. N., and Silin, D. B. Entry Tests to the Moscow State University. *Mathematics in School*, 1992, N 1, p.32-40, in Russian

CONFERENCE PAPERS, REPORTS, AND OTHER PUBLICATIONS

1. Molins, S. and Silin, D. Pore-scale modeling of biogeochemical alteration of the transport properties of sediment. Eos Trans. AGU, 90(52), Fall Meet. Suppl., Abstract H13B-0949, 2009
2. Silin, D.,. Ajo Franklin, J. B., Cabrini, S., Kneafsey, T. J., MacDowell, A. Nico, P. S., and Tomutsa, L. Pore-scale studies of unconventional reservoir rocks. Eos Trans. AGU, 90(52), Fall Meet. Suppl., Abstract H23F-1018.
3. Silin, D. and Patzek, T. Predicting Relative-Permeability Curves Directly From Rock Images. SPE paper 124974 presented at the SPE Annual Technical Conference and Exhibition, 4-7 October 2009, New Orleans, Louisiana, 2009. Society of Petroleum Engineers
4. Silin, D, and Robin, G. Combining step-rate well test with transient pressure test: is it possible?. SPE paper 121524 presented at the 2009 SPE Western Regional Meeting held in San Jose, California, USA, 24–26 March 2009.
5. Silin, D., and Goloshubin, G. A Low-Frequency Asymptotic Model of Seismic Reflection from a High-Permeability Layer. 2009 LBNL report 1634E.
6. Silin, D. and Patzek, T. A pore-scale model of two-phase flow in water-wet rock. 2009 LBNL report 1569E.
7. Silin, D., and Goloshubin, G. Seismic Wave Reflection from a Permeable Layer: Low-Frequency Asymptotic Analysis. Paper IMECE2008-67565. Proceedings of IMECE2008, 2008 ASME International Mechanical Engineering Congress and Exposition, October 31-November 6, 2008, Boston, Massachusetts, USA
8. Silin, D., Tomutsa, L., Benson, S M., Patzek, T W. Pore-Scale Analysis of Microtomography Images of the Rock in Geosequestration Research. Eos Trans. AGU, 89(53), Fall Meet. Suppl., Abstract H12C-07, 2008
9. Silin, D. A Generalization of Pontryagin's Alternating Integral and Generalized Solutions to Hamilton-Jacobi Equations. Differential Equations and Topology. International conference in commemoration of the 100th Anniversary of the birthday of Lev Semenovich Pontryagin (1908—1988). Moscow, Russia, 17-21 June 2008
10. Silin, D. A variational model of disjoining pressure: liquid film on a non-planar surface. Plenary presentation at EuroMech-499 Colloquium Nonlinear Mechanics of Multiphase Flow in Porous Media. Nancy, France, June 9-12, 2008
11. Goloshubin, G., D. Silin, V. Vingalov, G.V. Takkand Reservoir Average Permeability from Seismic and Log Data. Paper A012 presented at European Association of Geoscientists & Engineers Conference in St Petersburg, 2008.
12. Holtzman, R., Silin, D.B., Patzek, T.W., Mechanical Properties of Granular Materials: A Variational Approach to Grain-Scale Simulations. 8th. World Congress on Computational Mechanics & 5th. European Congress on Computational Methods in Applied Sciences and Engineering, Venice, Italy, 2008.
13. Holtzman, R., Silin, D.B., Patzek, T.W., Frictional Granular Mechanics: A Variational Approach to Grain-Scale Simulations. Oral presentation, CMG 2008 - 27th IUGG Conference on Mathematical Geophysics, Longyearbyen, Norway, 2008

14. Holtzman, R. D. B. Silin, T. W. Patzek: Micromechanics of Hydrate Dissociation in Marine Sediments by Grain-Scale Simulations. Paper SPE 114223 presented at SPE Western Regional and Pacific Section AAPG Joint Meeting, 29 March-2 April 2008, Bakersfield, California, USA.

15. Holtzman, R. D. B. Silin, T. W. Patzek. Micromechanics of Hydrate-Bearing Sediments by Grain-Scale Simulations. . Eos Trans. AGU, 88(52), 2007 Fall Meet. Suppl., Abstract OS22A-07.

16. Holtzman, R. , T. W. Patzek, and D. B. Silin: Deformations of Sediments via Grain-Scale Simulations: A Quasi Static Approach. Eos Trans. AGU, 88(52), 2007 Fall Meet. Suppl., Abstract T43E-04

17. Olav Inge Frette, George Virnovsky, and Dmitriy Silin.. Estimation of curvature of a flat curve from digital 2D images. Report IRIS - 2007/144

18. Silin, D., Patzek, T, and Benson, S. M. Modeling Leaking Gas Plume Migration. 2007 Ground Water Protection Council Annual Forum. San Diego, CA, September 16-19, 2007

19. Goloshubin, G. and D. Silin, V. Vingalov, M. Latfullin. Seismic reflection from a porous layer with high permeable lenses. 77th SEG Meeting San Antonio, TX, 23-28 September 2007

20. Holtzman, R. D. B. Silin, T. W. Patzek: Estimating Macroscopic Mechanical Properties Via Grain-Scale Simulations. 2007 AAPG Annual Convention and Exhibition (April 1 - 4, 2007) Long Beach, CA

21. Goloshubin, G. and D. Silin Wave Propagation in Porous medium: Biot-Barenblatt Model. International Symposium: Dr. Robert Sheriff's Scientific Contributions & 85th Birthday Houston, TX April 18-April 19 2007

22. Holtzman, R., Silin, D.B., Patzek, T.W., Mechanical properties of granular media via grain-scale simulations. 9th US National Congress in Computational Mechanics, San-Francicso, CA, 2007

23. Holtzman, R., Silin, D. B., and Patzek, T.W. (2006), The Strength of Hydrate-Bearing Sediments: A Grain-Scale Approach, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract MR51A-0960.

24. Goloshubin, G. and D. Silin, Frequency-dependent seismic reflection from a permeable boundary in a fractured reservoir, 76th SEG Meeting, p. 1742-1746 New Orleans. 2006

25. Goloshubin, G.; Silin, D. Dual porosity Biot-Barenblatt model. EAGE 68th Conference & Exhibition — Vienna, Austria, 12 - 15 June 2006.

26. Benson, Sally M., Tomutsa, L., Silin, D., Kneafsey, T., and Miljkovic, L. Core scale and pore scale studies of carbon dioxide migration in saline formations. 8th International Conference on Greenhouse Gas Control Technologies. Trondheim, Norway, 19-22 June 2006

27. Silin, D., T.W. Patzek, and S. M. Benson. Exact Solutions in a Model of Vertical Gas Migration. SPE 2006 SPE Annual Technical Conference and Exhibition held in San Antonio, Texas, U.S.A. LBNL-60922

28. Tomutsa, L., Silin, D., Benson, S. and Patzek, T. 2006. Synchrotron Microtomography in CO_2 Geosequestration Research, 5th Annual Conference on Carbon Capture and Sequestration, Alexandria, Virginia, May 8-11, 2006.

29. Silin, D., Goloshubin, G. (2006), On Biot-Barenblatt double porosity model of porous media, Eos Trans. AGU, 87(36), Jt. Assem. Suppl., Abstract S21A-09

30. Schwarz, K., T. Patzek, and D. Silin, (2006) On Prediction of wind-borne plumes with simple models of turbulent transport. LBNL/UC Berkeley, Berkeley, CA. LBNL-59656.

31. Tomutsa, L., Silin, D., Benson, S., and Patzek, T (2005), Synchrotron Microtomography in CO_2 Geosequestration Research, Eos Trans. AGU, 86(52), Fall Meet. Suppl., Abstract H33A-1381

32. Silin, D. B., Holtzman, R., Patzek, T.W., Brink, J. L., and Minner, M. L. Waterflood Surveillance and Control: Incorporating Hall Plot and Slope Analysis. SPE Paper Number 95685 2005 SPE Annual Technical Conference and Exhibition held in Dallas, Texas, U.S.A., 9 – 12 October 2005

33. Silin, D. B., Goloshubin, G. M., Korneev, V. A., and Patzek, T. W Low-Frequency Asymptotic Analysis of Reflection Coefficient from a Hydrocarbon Reservoir. Rainbow in the Earth – 2nd International Workshop 2005 Lawrence Berkeley National Laboratory, Berkeley, California, August 17-18, 2005

34. Goloshubin, G. M., and Silin, D. B.; Using frequency-dependent seismic attributes in imaging of a fractured reservoir zone. SEG Annual Meeting. Houston, TX, 2005

35. Silin, D. B., Holtzman, R., Patzek, T.W., and Brink, J. L. Monitoring Waterflood Operations: Hall's Method Revisited. SPE Paper Number 93879. 2005 SPE Western Regional Meeting held in Irvine, CA, 30 March – 1 April 2005.

36. Goloshubin, G. M., Korneev, V. M., and Silin, D. B. (2004), Reservoir Imaging Using Frequency-Dependent Seismic Attributes, Eos Trans. AGU,85(47), Fall Meet. Suppl., Abstract S31B-1062

37. Silin, D. B., Goloshubin, V. M., and Patzek, T. W., 2004, A Hydrologic View on Biot's Theory of Poroelasticity. LBNL Report 54459

38. Tomutsa, L. and Silin, D. Nanoscale Pore Imaging and Pore Scale Fluid Flow Modeling on Chalk. 25th IEA Workshop and Symposium on Enhanced Oil Recovery. Stavanger, Norway, September 5-8 2004.

39. Silin, D. B. Patzek, T.W., and Barenblatt, G. I. On Damage Propagation in a Soft Low-Permeability Formation. Second International Symposium Dynamics of Fluids in Fractured Rock. Berkeley, CA February 10-12 2004, p. 334-338

40. Korneev, V. A.; Silin, D.; Goloshubin, G. M., and Vingalov, V. Seismic imaging of oil production rate. 2004 SEG Annual Meeting. Denver, CO. October 10-15, 2004.

41. Jin, G., Patzek, T. W., and Silin, D. B. Direct prediction of the absolute permeability of unconsolidated and consolidated reservoir rock. 2004, SPE paper 90084

42. Silin, D. B., and C.-F. Tsang, Harlan, G. Replacing annual shut-in well tests by analysis of regular injection data: Field case feasibility study, Second International Symposium on Underground Injection Science and Technology 2003

43. Silin, D. B., Korneev, V. M., and Goloshubin, V. M., Pressure diffusion waves in porous media. 2003 Annual SEG Meeting, Dallas, TX, October 2003

44. Silin, D. B., Korneev, V. M., and Goloshubin, V. M., Diffusion Waves in Seismology? Eos Trans. AGU, 84(46), Abstract S22B-0454, 2003

45. Fielding, E. J., Brink, J. L., Patzek, T. W., Silin, D. B., Blom, R. G. Monitoring Subsidence Changes over the Lost Hills Diatomite Oil Field, California. Eos Trans. AGU, 84(46), Fall Meet. Suppl., Abstract G41A-04, 2003

46. Silin, D. B., Jin, G., and Patzek, T. W. Robust Determination of the Pore Space Morphology of Sedimentary Rocks. 2003 SPE Paper 84296

47. Jin, G. Patzek, T. W., and Silin, D. B. Physics-based Reconstruction of Sedimentary Rocks 2003, SPE Paper 83587

48. Silin, D., and Patzek, T. An object-oriented cluster search algorithm; 2003 LBNL Report LBNL-51599

49. Brink, J. L., Patzek, T. W., Silin, D. B., and Fielding, E. J. Lost Hills Field Trial - Incorporating New Technology for Reservoir Management 2002 SPE Paper 77646

50. Patzek, T. W., Silin, D. B., and Fielding, E. Use of Satellite Radar Images for Surveillance and Control of Two Giant Oilfields in California 2002 SPE Paper 77610

51. Barenblatt, G. I., Patzek, T. W., Prostokishin, V. M., and Silin, D. B. Oil Deposits in Diatomites: A New Challenge for Subterranean Mechanics 2002 SPE Paper 75230

52. Patzek, T. W. and Silin, D. B., Mathematical and Numerical Methods in Earth Sciences, U. C. Berkeley, E241 Class Reader, 1999, 2000

53. Patzek, T. W., and Silin, D. B. Control of Fluid Injection into a Low-Permeability Rock - 1. 1998 SPE/DOE Improved Oil Recovery Symposium held in Tulsa, Oklahoma, 19–22 April 1998.

54. Fogwell, T. W., and Silin, D. B. Optimal Control Theory Methods Applied to Inverse Problems in Modeling Porous Media Flow. Report to NAS/NRC. 1997.

55. Silin, D. B. Computing viscosity solutions using conjugate integral. In: Modern Problems of Mathematics and Mechanics. Transactions of International Conference dedicated to 175th anniversary of P. L Chebyshev. **2**. Mechanics and Mathematics. Moscow University. Publishers. 1996, p. 311-314.

56. Silin, D.B., and Trinko, N. G. A Convexification Algorithm for the Modeling of Nonlinear Dynamic Processes. In: World Congress of Nonlinear Analysts '92, Proceedings. V.Lakshmikantham, ed. Walter de Gruyter, N.Y 1996.

57. Silin, D.B. On discontinuous optimal control. System Modelling and Optimization, Proc. of the 17th IFIP TC7 Conference, Prague 1995 (J. Dolezal and J. Fidler, eds.), Chapman & Hall

58. Silin, D.B. Viscosity Solutions via Unbounded Set-Valued Integration. Preprint 297, 1995. Institut für Mathematik, Karl-Franzens-Universität Graz.

59. Silin, D. B. On Set-Valued Integral Equations. Preprint 299, 1994. Institut für Mathematik, Karl-Franzens-Universität Graz.

60. Silin, D. B. Conjugate integral and Hopf's formula in non-autonomous case. Preprint 295, 1994. Institut für Mathematik, Karl-Franzens-Universität Graz.

61. Silin, D. B. Continuous Selectors of Upper Semicontinuous Set-Valued Mappings. XVI School on the Theory Linear Operators in Functional Spaces. Lectures. Nizhni Novgorod, 1992, p. 173-191, in Russian
62. Silin, D. B., and Sturua, B. G. Mathematical modeling of Ion-Ray Etching Processes. In Proceedings of the Conference on Electronic Circuits Design. Ul'anovsk, 1991, p. 56, in Russian
63. Silin, D. B., and Khailov, E. N. Optimal Control Computation for Technological Nonlinear Diffusion Process. In Proceedings of the Conference on Electronic Circuits Design. Ul'anovsk, 1991, p. 35, in Russian
64. Silin, D. B. On Discontinuous Optimal Control. In Modeling and Control of Systems with Uncertainties. Birkhauser, Boston, 1991, p. 391-398.
65. Silin, D. B., and Sturua, B. G. Mathematical Modeling of Ion-Ray Etching Processes. Proceedings of the First International Conference on Circuits Design "Interpribor-90". Moscow, 1990, **2**, p.15-16, in Russian
66. Kisselev, Yu.N., Muravey, L. A., Orlov, M. V., and Silin, D. B. Some Problems of Optimization of Construction of Semi-Conductor Devices. Proceedings of the First International Conference for Circuits Design "Interpribor-90". Moscow, 1990, **2**, p. 51-53, in Russian
67. Silin, D. B. On Typical Optimal Controls in Linear Problems. In Proceedings of Pontryagin School. Kemerovo, 1990, in Russian
68. Silin, D. B. On Typical Properties of Optimal Controls in Linear Problems. In Proceedings of 7th Conference on Optimal Control in Mechanics. Sverdlovsk, 1990, in Russian
69. Silin, D. B. Necessary and Sufficient Conditions in Time-Optimal Control Problems. Moscow University Publishers, 1989, in Russian
70. Arutyunov, A. V., Zerkalov, L. G., and Silin, D. B. Necessary Optimality Conditions for a Minimax Problem. In Proceedings of XI All-Union Symposium on Control Problems, Tashkent, 1989, p.6, in Russian
71. Kisselev, Yu. N., Muravey, L. A., Petrov, V. M., and Silin, D. B. Some Problems of Control for Semiconductor Technological Processes. In Dynamics of Nonlinear Processes. Tallinn, 1987, p.174, in Russian
72. Kisselev, Yu. N., and Silin, D. B. Some Problems of Control for Ion-Ray Etching Process. In Modeling of Control Systems with Distributed Parameters. Odessa, 1987, in Russian
73. Silin, D. B. Problems in Optimal Control. Moscow University Publishers, 1987. In Russian
74. Silin, D. B. On Discontinuous Strategies in the First Direct Pontryagin Method. In Numerical Methods in Mathem. Phys. Moscow University Publishers, 1986, p. 74-75, in Russian
75. Silin, D. B. On Singular Optimal Controls in Linear Problems with free Right Terminal Condition. In Some Problems of Modern Math. and Applications to Mathem. Phys. Moscow Phys. and Techn. Inst. Publishers, Moscow, 1985, p.125-128, in Russian
76. Silin, D. B. On Existence of a Discontonuous Optimal Control in a Time-Optimal Control Ploblem. In Applied Mathematics and Software. Moscow University, 1985, p. 35-37, in Russian
77. Silin, D. B. Riemann integrability of optimal control in linear time-optimal problems. International Congress of Mathematicians-82, Short Communications, XII. Warsaw, 1983, p. 34
78. Silin, D. B. On the Smoothness of Time-Optimal Controls. Proceedings of IX Symposium on Conrol Problems. Yerevan, 1983, p. 90, in Russian
79. Silin, D. B. On Local Controllability for Linear Inertial Systems. In Some Problems of Appl. Maths. and Software. Moscow University Publishers, 1982, p. 84-86, in Russian
80. Silin, D. B. On Singular Optimal Controls. In Appl. Math. and Math. Software, Moscow University Publishers, 1981, p. 77-79, in Russian

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1. Pore-Scale Modeling of Two-Phase Flow in Natural Rocks. Stanford University, June 10, 2009.
2. Development and Verification of a Pore-Scale Model of Natural Rocks. University of Texas, Austin, April 20, 2009
3. Well test analysis: An inverse problem of injection site characterization. LBNL Earth Science Division Modeling Forum February 04, 2009

4. Evaluation of rock flow properties from microtomography images of the pore space. Stanford University, October 21, 2008.
5. Pore-scale modeling of natural rocks: opportunities and limitations. LBNL Earth Science Division Modeling Forum October 01, 2008
6. Pore-Scale Modeling of Natural Rocks. University of Texas, Austin, May 13, 2008
7. A Derivation and Asymptotic Analysis of Biot's Equations. LBNL Department of Geophysics seminar. November 30, 2007
8. A Model of Countercurrent Vertical Flow of Gas Plume. Stanford University, October 30, 2007
9. Field-Scale Waterflood Surveillance and Control: Data Processing and Integration. II International Seminar on Oilfield Water Management. Rio de Janeiro, Brazil 16-19 October 2007. Invited presentation
10. Lost Hills Waterflood Monitoring and Control: Data Integration. Chevron, Lost Hills, CA June 28 2007
11. Modeling and imaging natural rocks at a microscopic scale. International Research Institute Stavanger. Stavanger, Norway, February 12, 2007
12. Mechanics of Natural Rocks at a Microscopic Scale. University of Stavanger. Stavanger, Norway, March 22, 2007
13. On frequency-dependent reflection coefficient from a permeable layer, CAGE Annual Meeting. University of Houston, Houston, TX, December 04 2006
14. i-Waterflood: data transfer and processing. Chevron Lost Hills, CA, August 17, 2006
15. Lost Hills Waterflood surveillance and control. Chevron Corporation. Bakersfield, CA. February 2, 2006.
16. Biot-Barenblatt double porosity theory. University of Houston, Houston, TX. December 5, 2005.
17. Monitoring waterflood. Chevron Corporation. Lost Hills, CA. October 2005.
18. Diatomite Studies in Berkeley: Across the Scales. West Coast Petroleum Technology Transfer Council. Valencia, CA, January 2004
19. Direct Analysis of the Pore Space Morphology and Rock Flow Properties. StatOil, Trondheim, Norway, March 2004
20. Direct Analysis of the Pore Space Morphology and Rock Flow Properties. Rogaland Research, Stavanger, Norway March 31, 2004
21. On Barenblatt's Model of Nonequilibrium Countercurrent Imbibition. Rogaland Research, Stavanger, Norway March 31, 2004
22. On Barenblatt's Model of Nonequilibrium Countercurrent Imbibition. Stanford University, Palo Alto, CA, May 13, 2004
23. Replacing annual shut-in well tests by analysis of regular injection data. US EPA, San Francisco, CA, June 17, 2004
24. Automatic waterflood surveillance and control. ChevronTexaco, Lost Hills, CA, October 11, 2004
25. Nanometer-scale pore imaging and pore-scale fluid flow modeling. ChevronTexaco, San Ramon, CA, November 1 2004
26. A well test analysis method accounting for pre-test operations, ChevronTexaco, San Ramon, CA, June 2003